

BACKGROUND

In 2021, 1.1% of US adults reported active epilepsy (Kobau, 2023), and one-third of patients with epilepsy are drug-resistant (Roa, 2022). Drug-resistant epilepsy, also known as medically refractory epilepsy can be diagnosed after the failure of two antiepileptic medications. The Responsive Neurostimulation System (RNS) is an implanted device for treatment of refractory epilepsy which delivers an electrical stimulus when seizure activity is detected. Mean seizure reduction after hippocampal RNS implantation is around 70% (Vetkas, 2022).

Epilepsy increases lifetime prevalence of anxiety disorders, with a prevalence of 22.8% of anxiety in people with epilepsy compared to 11.2% in people without epilepsy (Brandt, 2016). Anxiety in patients with epilepsy can be ictal, postictal, interictal, or any combination, and can include panic symptoms, possibly due to the role of the hippocampus in regulating fear. Patients are documented to have symptoms when their RNS device is triggered not related to their seizure symptoms. Limited research has been conducted on this. One study showed the most common symptoms are visual and sensory changes, specifically phosphenes and scalp paresthesias (Quraishi, 2021). These symptoms are related to electrode placement (Figure 1) and dependent on achieving threshold charge density. There is no report of psychiatric symptoms as either a symptom of RNS discharge or associated with other stimulation-induced symptoms. This case presents a patient with underlying depressive and anxiety symptoms with exacerbation that is temporally correlated with RNS stimulation.

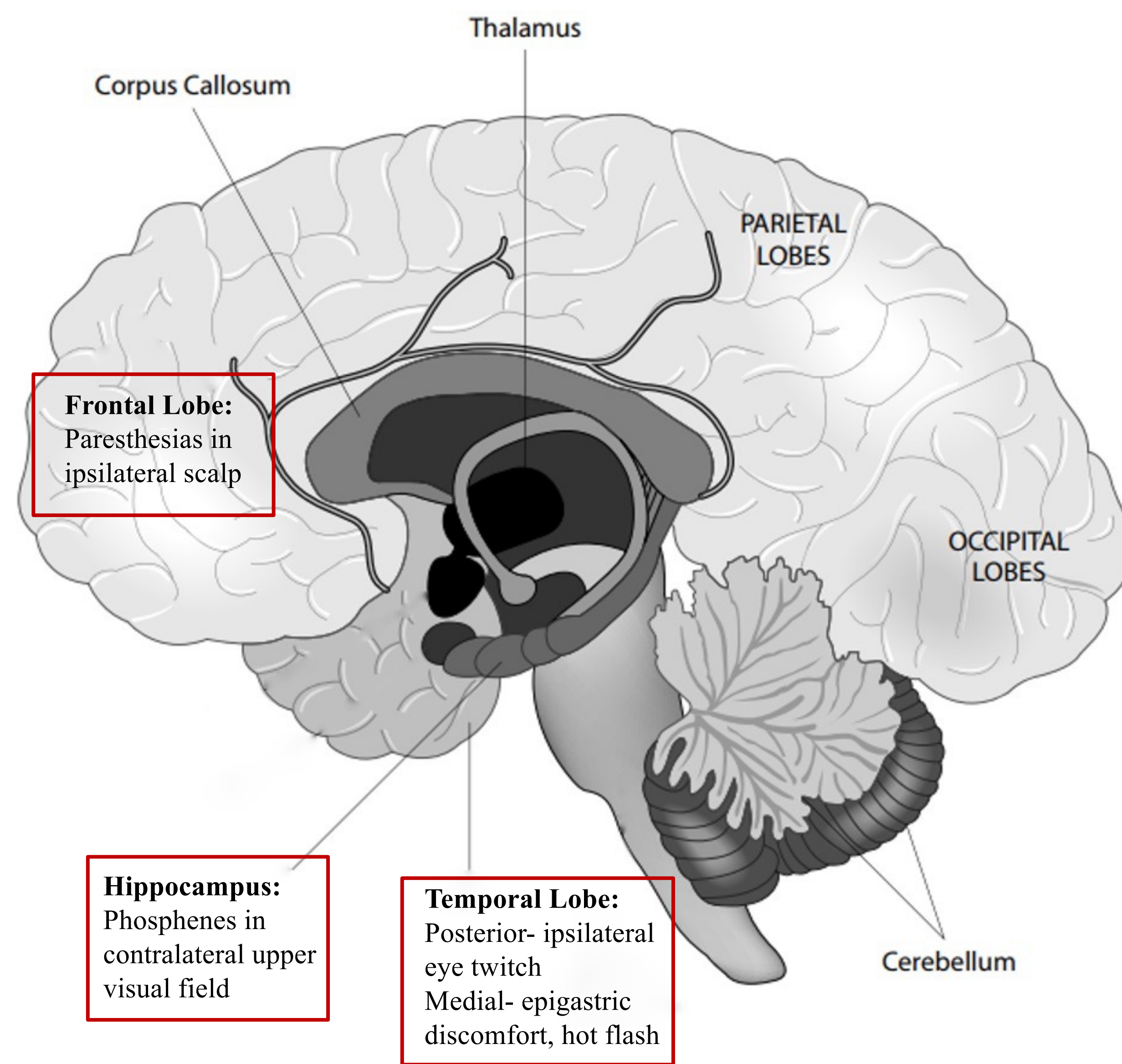


Figure 1. Neurostimulator-induced symptoms (Schunk, 2021; Quarishi, 2021)

PRESENTATION

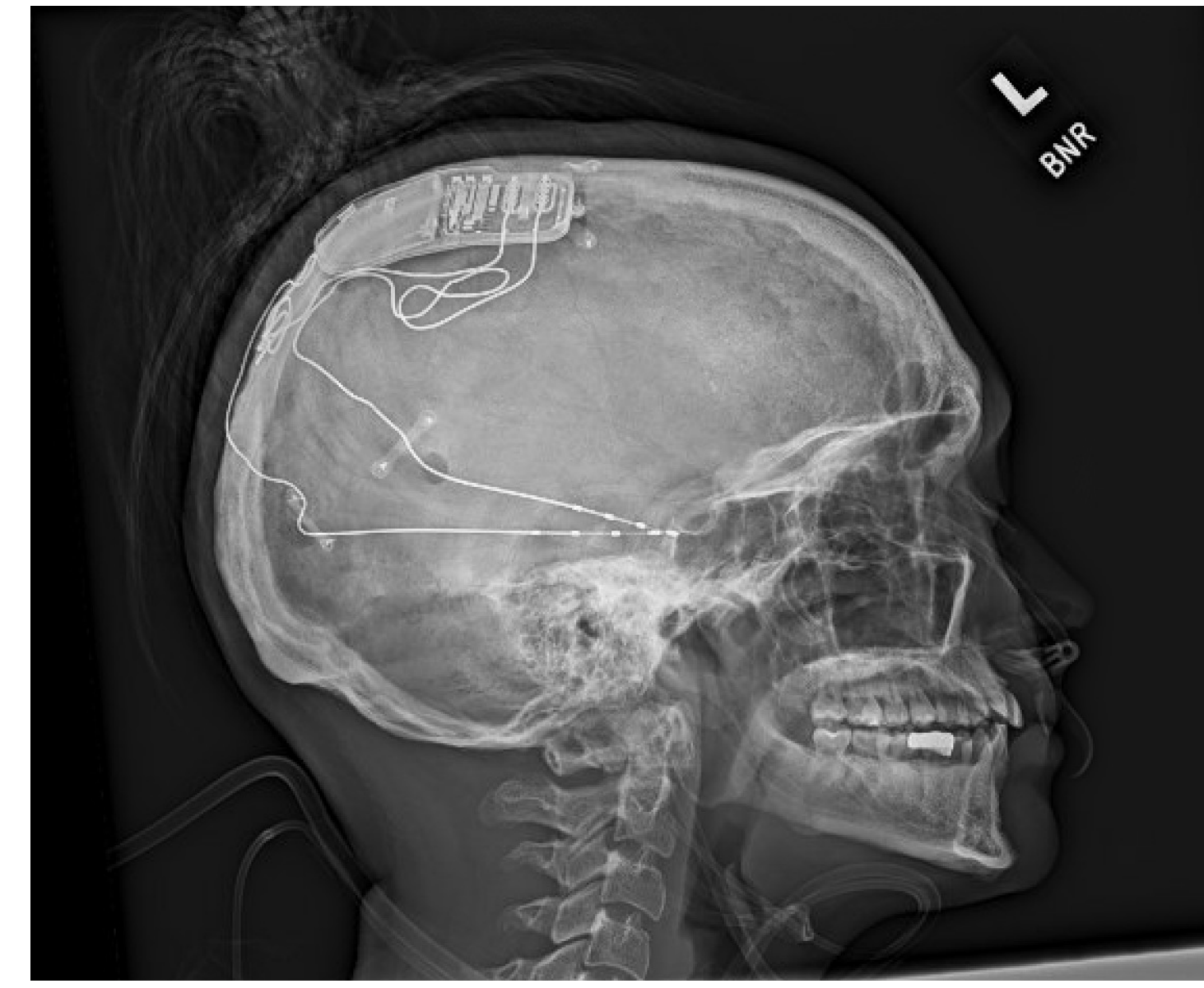
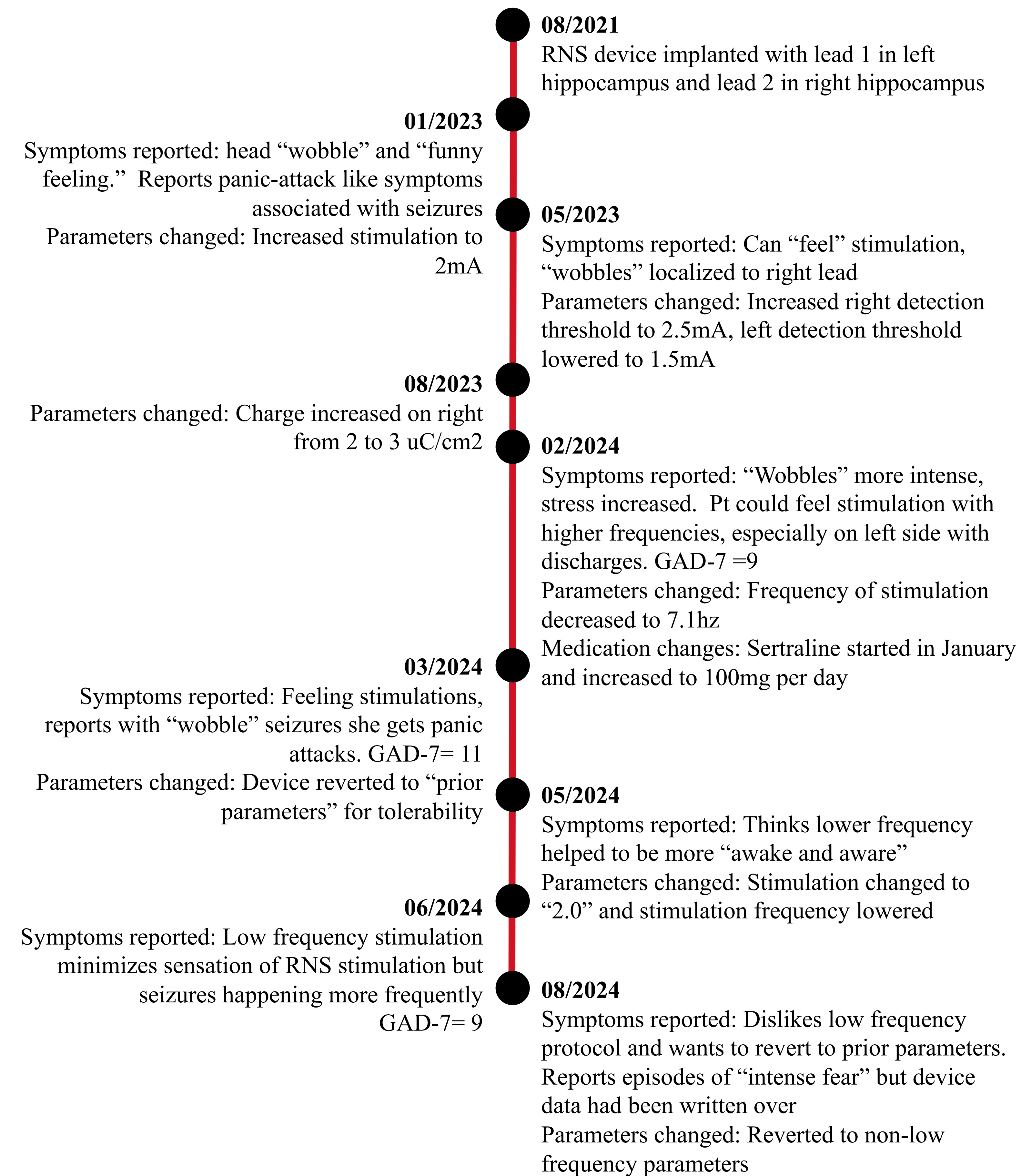


Figure 2. RNS implantation post-surgical imaging

- Female patient with bitemporal intractable epilepsy now with RNS device (Figure 2) who developed panic attack-like symptoms associated with device stimulation.
- The patient's seizures remained intractable until RNS stimulation was increased. She shortly thereafter had intermittent stimulation triggered signs of left scalp paresthesia and tapping sensations.
- This led to panic attack symptoms during device stimulation including severe anxiety, rapid breathing, and tremulousness specifically when the device was at higher amperage, subsiding when the amperage was reduced.



DISCUSSION

While patients with drug-resistant epilepsy are known to be at higher risk of developing psychiatric conditions, the stimulation-triggered symptoms or associated psychiatric reactions are less well established. It is unclear whether stimulation-triggered symptoms include psychiatric symptoms or whether the experience of stimulation-triggered symptoms results in psychiatric symptoms. We believe these panic symptoms in our patient were experience-related, as the patient felt reassured after education about stimulation-triggered symptoms. The patient elected to increase her stimulation amperage for better seizure control despite knowing her symptoms could return. Regardless, this case represents a novel instance of RNS-associated panic attack-like symptoms, which resolved after reducing stimulation device settings.

Our case report is limited by documentation of exact device stimulation parameters as they relate to subjective patient experience. Furthermore, documentation of parameters changed during each visit are not standardized, making comparison between visits more challenging.

CONCLUSION/IMPLICATIONS

This case highlights a gap in the evidence for psychiatric management of patients with epilepsy and implanted neurostimulators. This could represent a population that needs continued psychiatric follow-up post-device implant to monitor for the development of symptoms. It is also important for education of other specialties managing these patients to be aware of indirect and direct neuropsychiatric effects related to responsive neurostimulation.

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